



Blind Friendly Maps

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► To cite this version:

Petr Červenka, Karel Brinda, Radek Seifert, Petr Hofman. Blind Friendly Maps. International Conference on Sensory issues and Disability: Touch to learn, touch to communicate, Mar 2016, Paris, France. 2016. hal-01289174

HAL Id: hal-01289174

<https://hal.science/hal-01289174>

Submitted on 16 Mar 2016

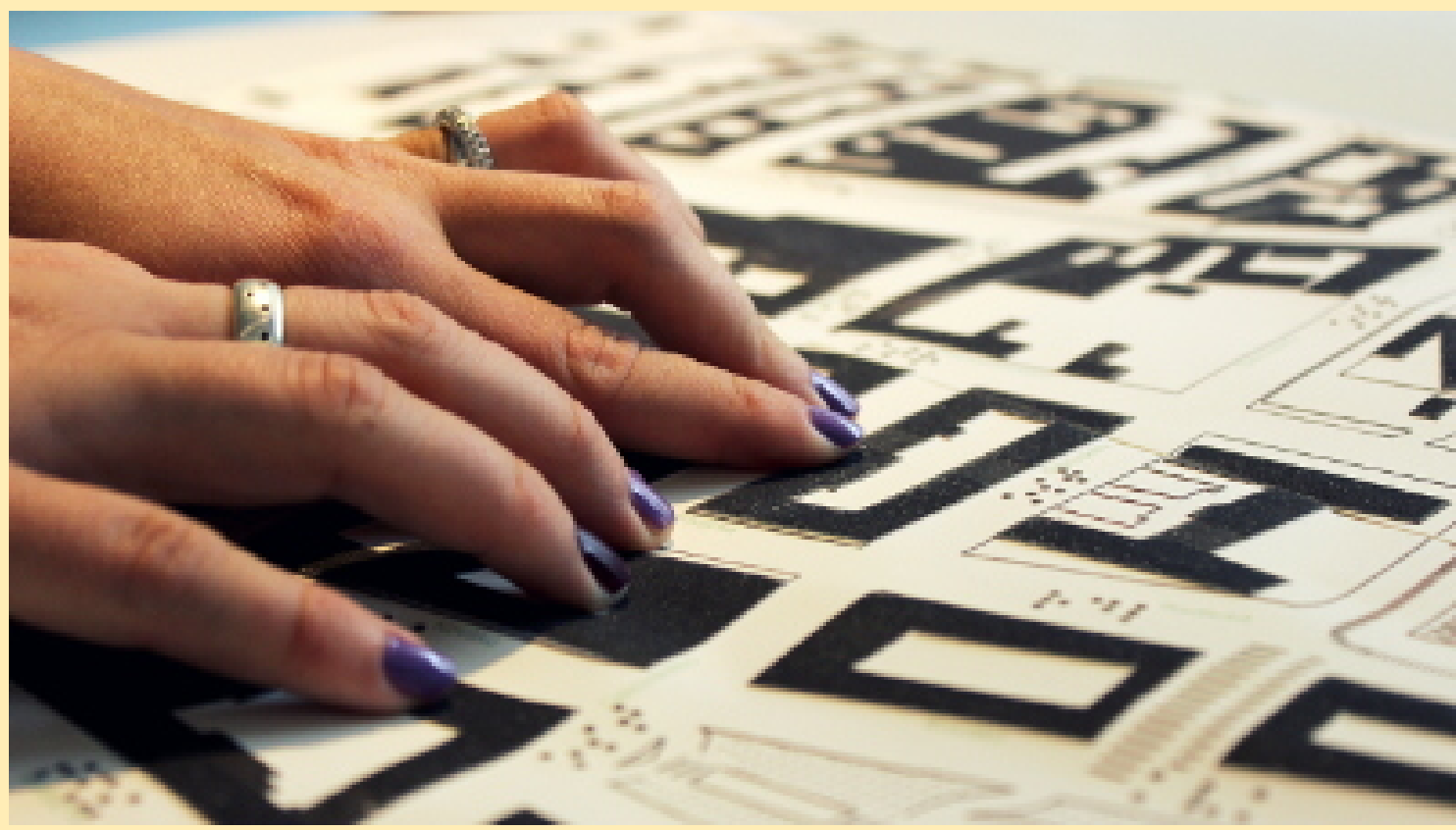
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Introduction

- **Tactile map** is the most appropriate source of spatial information for blind users
- Traditional map production is a matter of time consuming manual work
- We have developed **Blind Friendly Maps**, a web service providing instant access to tactile maps of arbitrary area

<http://hapticke.mapy.cz>



History of BFM

2006 Beginning of collaboration between CTU in Prague and Seznam.cz

Goal: improving accessibility of web interfaces of Seznam.cz (“Czech Google”)

2007 Idea: “Let us make maps on the Mapy.cz portal accessible for blind users!”

2007 Development of raster-based BFM

- Several prototypes developed
- Rendering tactile maps from raster maps (no vector geodata available at that time)
- Comprehensibility of obtained maps very limited (many artefacts in the images, no street names, etc.)

2011 Seznam.cz acquired vector geodata

- Acquisition of the PlanStudio company with its geographical information system (GIS)

2011 Development of vector-based BFM

- Individual steps:
 1. Development of a map key
 2. Development of a generator of Braille code acronyms
 3. Integration of BFM into Mapy.cz
 4. Testing with blind users

2014 Blind Friendly Maps released

<http://hapticke.mapy.cz> (see the highest zoom)

Current state

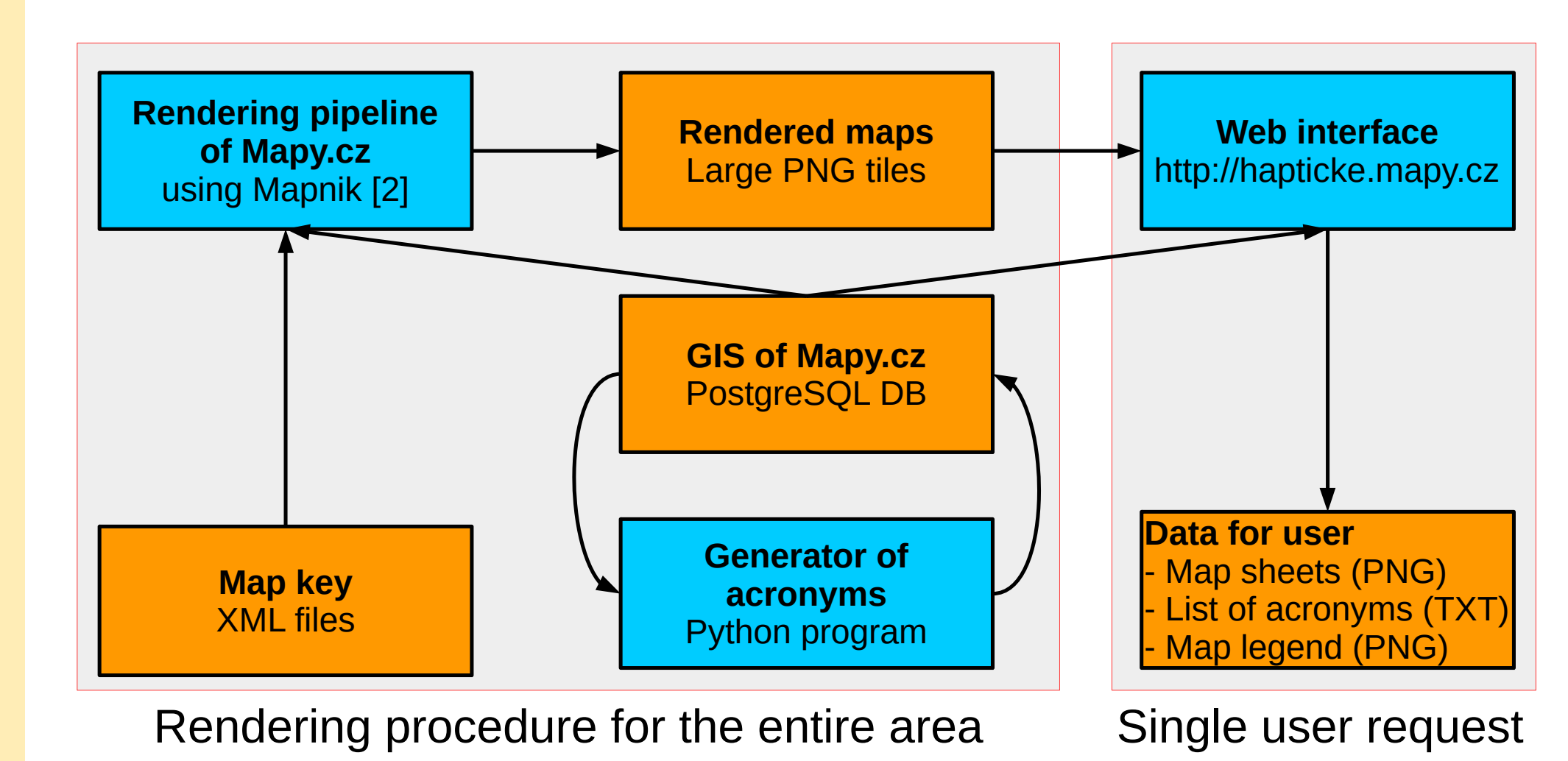
- Rendered for the **entire Czech Republic** at a single scale of 1:1500
- **Publicly available** within the most popular Czech map portal Mapy.cz
- **Regularly updated** in the same mode as standard maps

Ongoing work

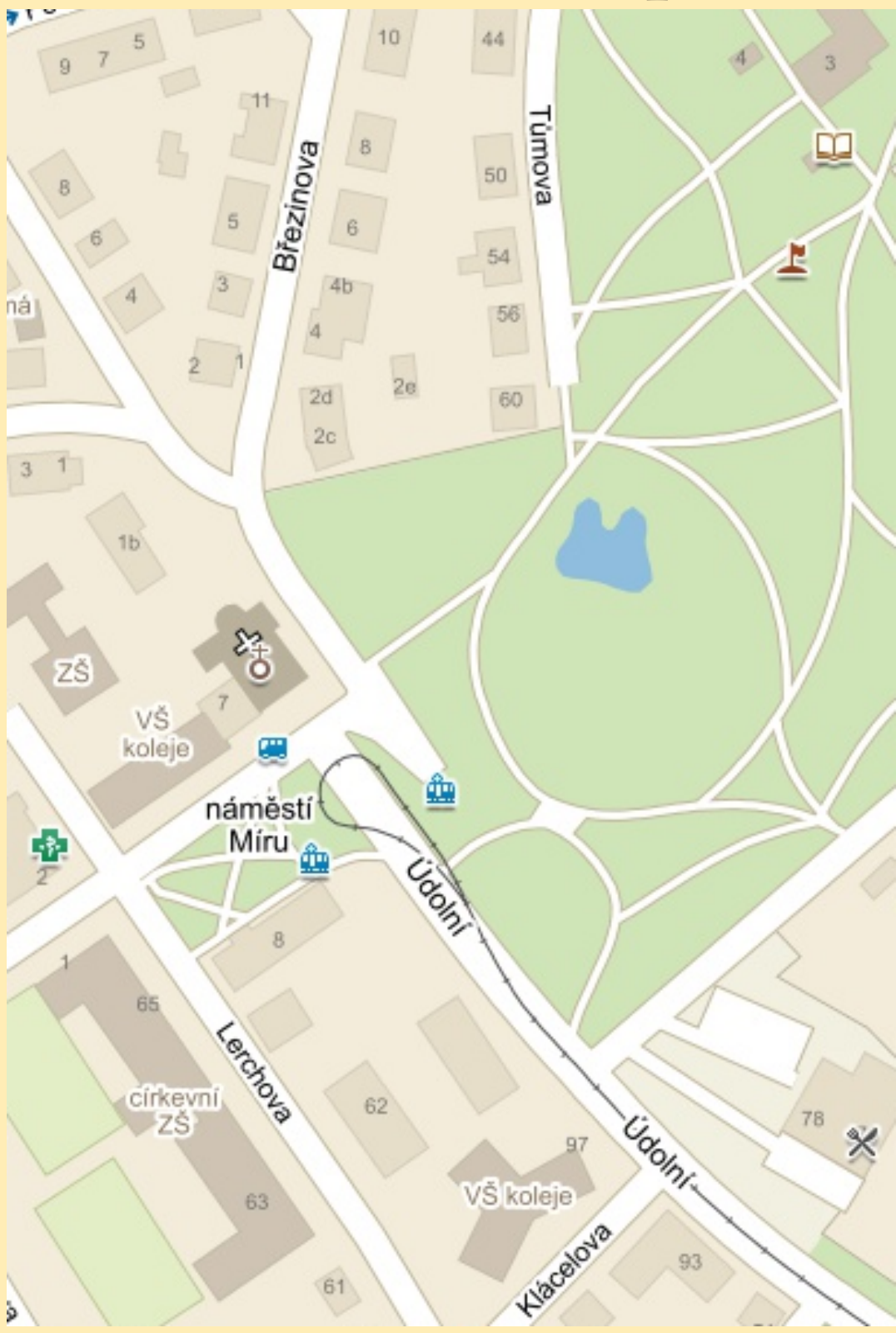
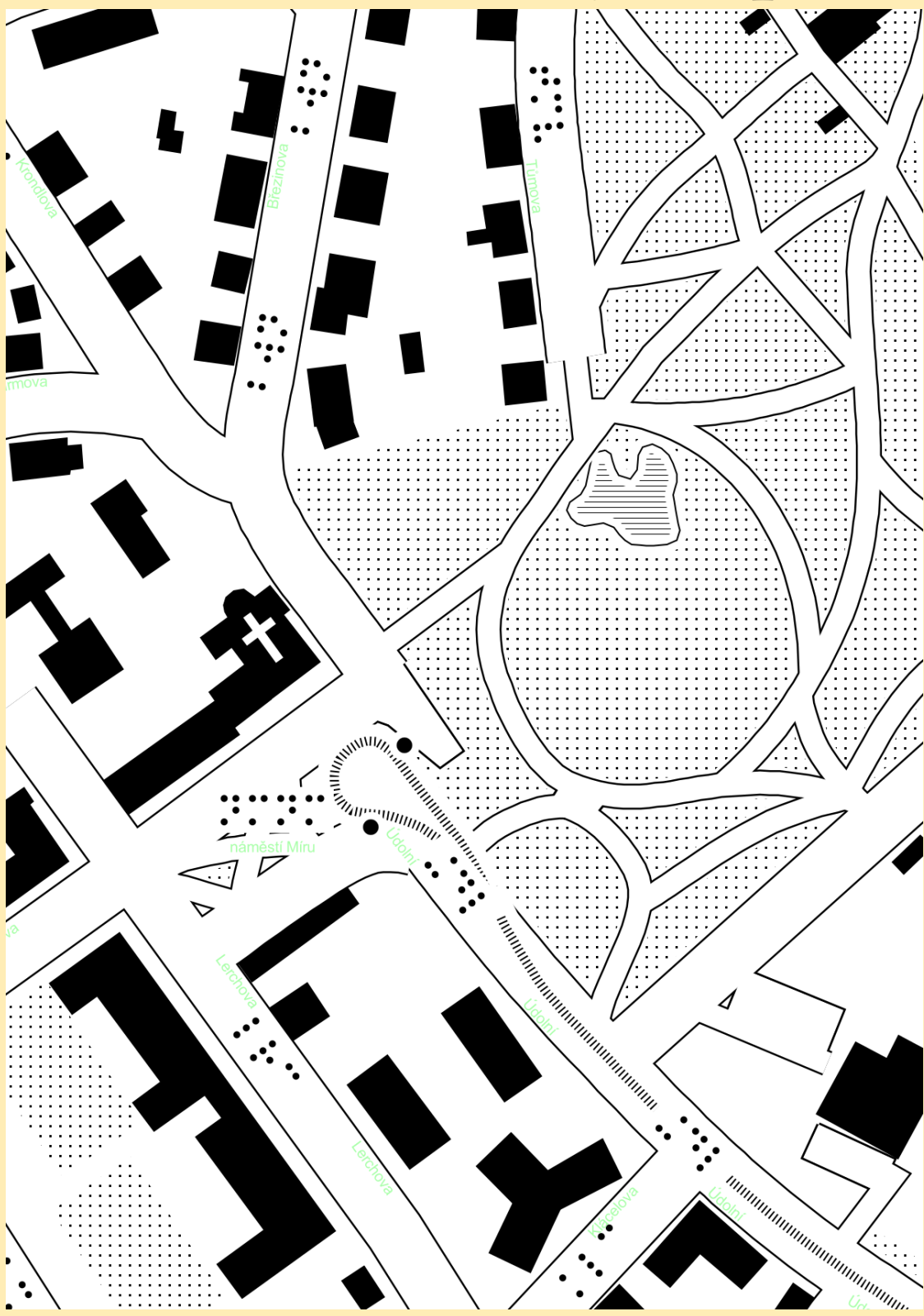
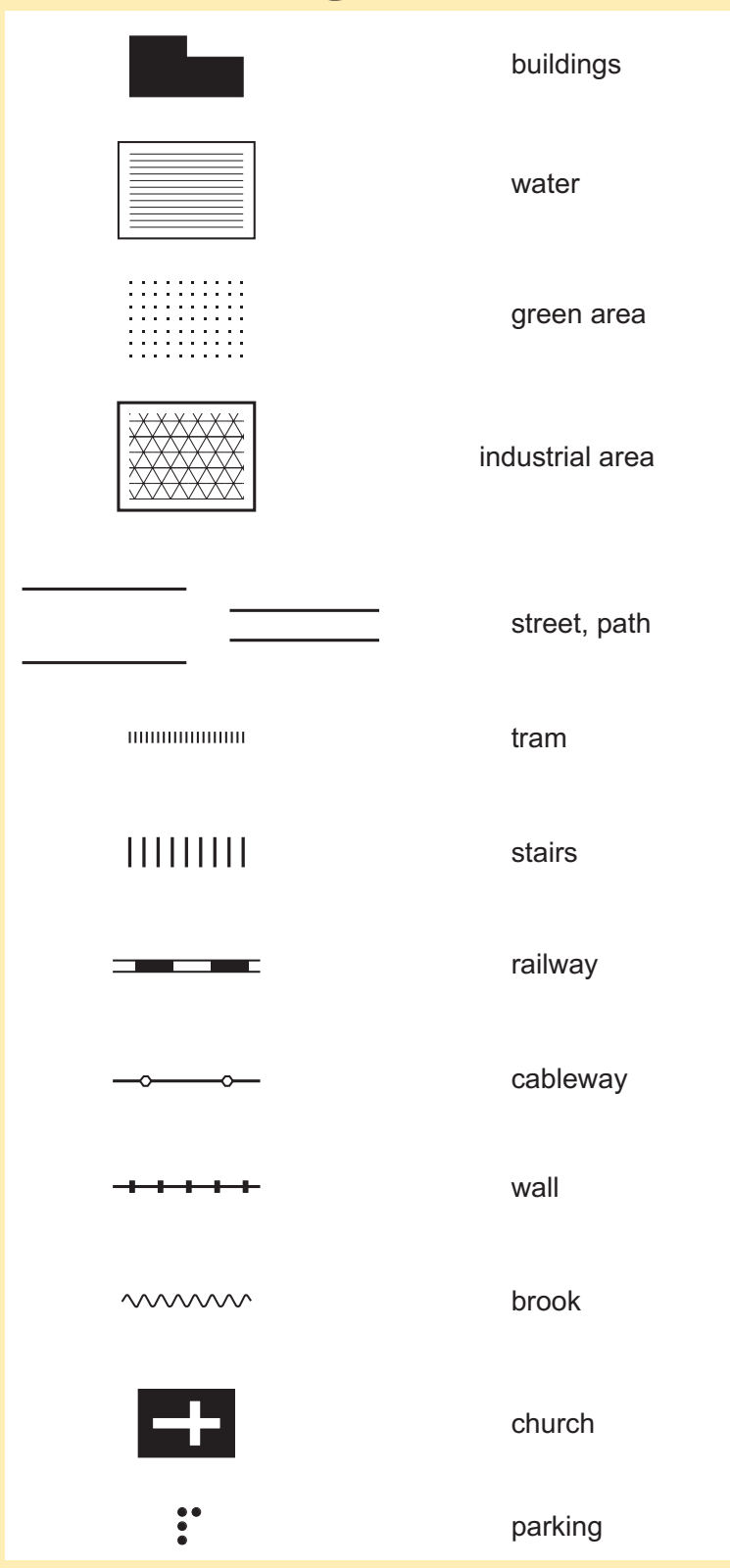
- 1) **Smaller scales** (almost finished)
- 2) **Extension to Slovakia** (almost finished)
- 3) **Extension to the entire world**
 - Map key for Open Street Maps geodata [3]
 - Acronym generator for international names

Methods

- **Rendering with Mapnik** [2], using the same pipelines and from the same database as standard maps
- **Developing a special map key**, many constraints:
 1. Fixed size of Braille characters
 2. White margins around objects
 3. Limited number of used textures
 4. Low density of displayed objects
- **Map lettering in Braille code** using locally unique acronyms (3 letters for street names, 4 letters for square names)



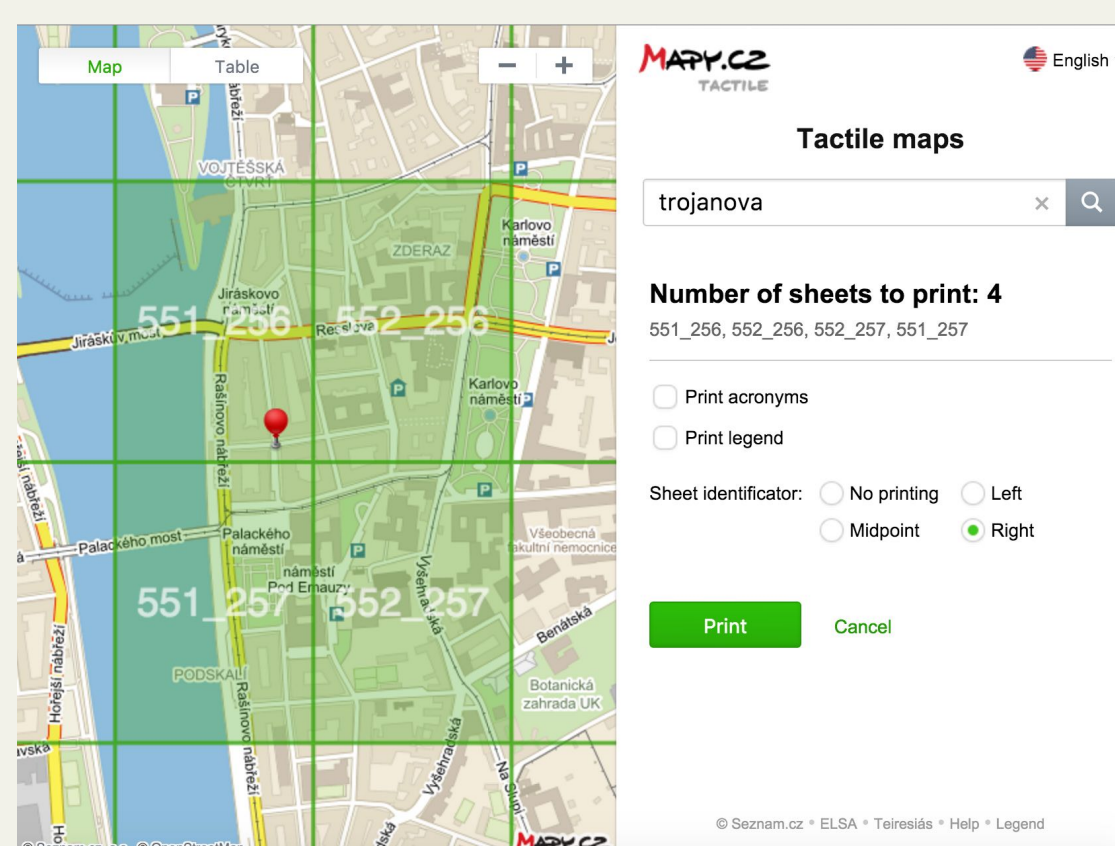
Results

Standard map	Blind Friendly Map	Legend	List of acronyms																																	
			<table border="1"><tr><td>břn</td><td>–</td><td>Březinova</td></tr><tr><td>hnr</td><td>–</td><td>Heinrichova</td></tr><tr><td>hvč</td><td>–</td><td>Havlíčkova</td></tr><tr><td>klc</td><td>–</td><td>Klácelova</td></tr><tr><td>krn</td><td>–</td><td>Krondlova</td></tr><tr><td>lrc</td><td>–</td><td>Lerchova</td></tr><tr><td>nmnm</td><td>–</td><td>náměstí Míru</td></tr><tr><td>rdš</td><td>–</td><td>Rudišova</td></tr><tr><td>tmv</td><td>–</td><td>Tůmová</td></tr><tr><td>údl</td><td>–</td><td>Údolní</td></tr><tr><td>wrm</td><td>–</td><td>Wurmova</td></tr></table>	břn	–	Březinova	hnr	–	Heinrichova	hvč	–	Havlíčkova	klc	–	Klácelova	krn	–	Krondlova	lrc	–	Lerchova	nmnm	–	náměstí Míru	rdš	–	Rudišova	tmv	–	Tůmová	údl	–	Údolní	wrm	–	Wurmova
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Printing and preparation

STEP 1 (1 minute)

Open <http://hapticke.mapy.cz>, find area of interest and download your map sheets.



STEP 2 (1 minute)

Using a standard printer, print map sheets on swell (microcapsule) papers.



STEP 3 (2 minutes)

Apply a heating machine [4, 5] on your sheets to obtain the final tactile relief.



STEP 4 (1 minute)

Print supplementary information on a Braille embosser (or use it as a text file).



**Blind Friendly
Maps**
5 minutes

vs.

**Traditional
approaches**

**at least
5 days**

References

- [1] P. Červenka, K. Břinda, R. Seifert, M. Hanousková, P. Hofman. **Blind friendly maps: Tactile maps for the blind as a part of the public map portal (mapy.cz)**. To appear in proceedings of ICCHP 2016.
- [2] Mapnik, <http://mapnik.org>.
- [3] Open Street Maps, <http://www.openstreetmap.org>.
- [4] Zyfuse heater, <http://www.zychem-ltd.co.uk/zyfuse-heater>.
- [5] Piaf Tactile, <http://piaf-tactile.com>.